



Fire Department

HEADQUARTERS

4410 Cathedral Oaks Road
Santa Barbara, CA 93110-1042
(805) 681-5500 FAX: (805) 681-5563

Eric Peterson
Fire Chief
County Fire Warden

Rob Heckman
Deputy Fire Chief

CODE SUMMARY

PERMITS – REFRIGERATION EQUIPMENT

A code summary is a compilation of code sections related to a specific occupancy or permit. This code summary lists sections of code pertaining to occupancies and operations as defined by the **California Fire Code**. Under each heading you will find the correlating code language and the reference cited. These requirements pertain to existing buildings. New construction may be subject to additional requirements. Please direct any questions to the Fire Prevention Division at (805) 681-5500.

SCOPE:

This summary is applicable to refrigeration machinery and systems having a refrigeration circuit containing more than 220 pounds of Group 1A, 30 pounds of any other group refrigerant, 6.6 pounds of flammable or combustible refrigerant or any amount of highly toxic refrigerant.

1. Refrigeration systems shall be installed in accordance with the *California Mechanical Code*. (See CMC Table 1102.2 below)
2. Refrigerants shall be classified in accordance with the *California Mechanical Code*.
3. A change in the type of refrigerant in a refrigeration system shall be in accordance with the *California Mechanical Code*. (CFC 606.1)

1. **An operational permit is required to operate a mechanical refrigeration unit or system regulated by Chapter 6 of the *California Fire Code*.**

A permit issued by the Santa Barbara County Fire Department is required for refrigeration machinery and systems having a refrigeration circuit containing more than 220 pounds of Group A1, 30 pounds of any other group refrigerant, 6.6 pounds of flammable or combustible refrigerant or any amount of highly toxic refrigerant. (CFC 105.6.38)

2. **Refrigeration units shall be accessible at all times to the fire department.**

Refrigeration machinery and systems meeting or exceeding the quantity limits above shall be accessible to the fire department at all times. (CFC 606.5)

3. **Refrigeration equipment shall be subject to periodic testing.**

A written record of required testing shall be maintained on the premises at all times. Testing shall be conducted by persons trained and qualified in refrigeration systems. The following emergency devices or systems shall be periodically tested in accordance with manufacturer's instructions:

- A. Treatment and flaring systems.
- B. Valves and appurtenances necessary to the operation of emergency refrigeration control boxes.
- C. Fans and associated equipment intended to operate emergency ventilation systems.
- D. Detection and alarm systems. (CFC 606.6.1)

4. Emergency signs are required.

Refrigeration machinery and systems meeting or exceeding the quantity limits above shall be provided with approved emergency signs, charts, and labels in accordance with NFPA 704. Hazard signs shall be in accordance with the *California Mechanical Code*. (CFC 606.7)

5. Machinery rooms shall contain a refrigerant detector with an audible and visual alarm.

The detector or a sampling tube that draws air to the detector shall be located in an area where refrigerant from a leak will concentrate. See *California Fire Code* Chapter 6 for additional detection system specifics. (CFC 606.8)

6. Remote controls are required for refrigeration systems using flammable refrigerants.

- A. Remote control of refrigerant equipment located in the machinery room shall be provide at an approved location outside the machinery room and adjacent to its principal entrance.
- B. A clearly identified switch shall provide off-only control of refrigerant compressors, pumps and normally closed automatic refrigerant valves located in the machinery room. See *California Fire Code* chapter 6 for additional control system specifics.
- C. A clearly identified switch shall provide on-only control of machinery ventilation fans. (CFC 606.9)

7. Refrigeration systems using 6.6 pounds or more of flammable, toxic or ammonia refrigerant shall be provided with an emergency pressure control system.

See *California Fire Code* Chapter 6 for pressure control system specifics. (CFC 606.10)

8. Flammable and combustible materials shall not be stored in machinery rooms for refrigeration systems meeting or exceeding the quantity limits above. (CFC 606.11)

9. Pressure relief devices, fusible plugs and purge systems for refrigeration systems containing more than 6.6 pounds of flammable or toxic refrigerants shall be provided with an approved discharge system as required by Chapter 6 of the *California Fire Code*.

See *California Fire Code* Chapter 6 for discharge system specifics. (CFC 606.12.1 thru 606.14)

10. A written record shall be kept of refrigerant quantities brought into and removed from the premises.

Such records shall be made available to the fire official. (CFC 606.15)

11. Where refrigerants of Groups A2, A3, B2, and B3 are used, refrigeration machinery rooms shall conform to the Class 1, Division 2 hazardous location requirements of the *California Electrical Code*.

Exception: Ammonia machinery rooms that are provided with ventilation systems in accordance with the *California Mechanical Code*. (CFC 606.16)

TECHNICAL ASSISTANCE

For additional specific requirements referenced above, contact the Santa Barbara County Fire Department Fire Prevention Services Division at 805-681-5500. Due to the complex building design of the requirements specified within the CFC and adopted standards, it is often necessary to obtain the service of a fire protection design professional to assist with developing a protection scheme that meets the requirements of both the business and the California Fire Code.

TABLE 1102.2
REFRIGERANT GROUPS, PROPERTIES, AND ALLOWABLE QUANTITIES^{1, 2, 3, 9}
[ASHRAE 34: TABLE 1, TABLE 2]

| REFRIGERANT | CHEMICAL FORMULA | CHEMICAL NAME ⁴ (COMPOSITION FOR BLENDS) | SAFETY GROUP ¹ | OEL ⁵ (ppm) | IDLH ⁶ (ppm) | POUNDS PER 1000 CUBIC FEET OF SPACE ⁷ |
|-------------|--|--|---------------------------|------------------------|-------------------------|--|
| R-11 | CCl ₃ F | Trichlorofluoromethane | A1 | C1000 ⁸ | 2000 | 0.39 |
| R-12 | CCl ₂ F ₂ | Dichlorodifluoromethane | A1 | 1000 | 15 000 | 5.6 |
| R-13 | CClF ₃ | Chlorotrifluoromethane | A1 | 1000 ¹⁰ | 67 000 | — |
| R-13B1 | CBrF ₃ | Bromotrifluoromethane | A1 | 1000 | 40 000 | — |
| R-14 | CF ₄ | Tetrafluoromethane (carbon tetrafluoride) | A1 | 1000 ¹⁰ | 67 000 | 25 |
| R-21 | CHCl ₂ F | Dichlorofluoromethane | B1 | 10 ¹⁴ | 5000 | — |
| R-22 | CHClF ₂ | Chlorodifluoromethane | A1 | 1000 ¹⁴ | 42 000 ¹¹ | 13 |
| R-23 | CHF ₃ | Trifluoromethane | A1 | 1000 ¹⁰ | — | 7.3 |
| R-30 | CH ₂ Cl ₂ | Dichloromethane (methylene chloride) | B2 | C1000 ⁸ | 2300 | — |
| R-32 | CH ₂ F ₂ | Difluoromethane (methylene fluoride) | A2 | 1000 ¹³ | — | 4.8 |
| R-40 | CH ₃ Cl | Chloromethane (methyl chloride) | B2 | 100 | 2000 | — |
| R-50 | CH ₄ | Methane | A3 | 1000 ¹⁰ | — | — |
| R-113 | CCl ₂ FCClF ₂ | 1, 1, 2-trichloro-1, 2, 2 - trifluoroethane | A1 | 1000 | 2000 | 1.2 |
| R-114 | CClF ₂ CClF ₂ | 1, 2-dichloro-1, 1, 2, 2 - tetrafluoroethane | A1 | 1000 | 15 000 | 8.7 |
| R-115 | CClF ₂ CF ₃ | Chloropentafluoroethane | A1 | 1000 ¹⁴ | — | 47 |
| R-116 | CF ₃ CF ₃ | Hexafluoroethane | A1 | 1000 ¹⁰ | — | 34 |
| R-123 | CHCl ₂ CF ₃ | 2, 2-dichloro-1, 1, 1, - trifluoroethane | B1 | 50 ¹³ | 4000 ¹¹ | 3.5 |
| R-124 | CHClFCF ₃ | 2-chloro-1, 1, 1, 2 - tetrafluoroethane | A1 | 1000 ¹³ | — | 3.5 |
| R-125 | CHF ₂ CF ₃ | Pentafluoroethane | A1 | 1000 ¹³ | — | 23 |
| R-134a | CH ₂ FCF ₃ | 1, 1, 1, 2-tetrafluoroethane | A1 | 1000 ¹³ | 50 000 ¹¹ | 13 |
| R-141b | CH ₃ CCl ₂ F | 1, 1-dichloro-1-fluoroethane | A1 | 500 ¹³ | — | 0.78 |
| R-142b | CH ₃ CClF ₂ | 1-chloro-1, 1-difluoroethane | A2 | 1000 ¹³ | — | 5.1 |
| R-143a | CH ₃ CF ₃ | 1, 1, 1-trifluoroethane | A2 | 1000 ¹³ | — | 4.5 |
| R-152a | CH ₃ CHF ₂ | 1, 1-difluoroethane | A2 | 1000 ¹³ | — | 2.0 |
| R-170 | CH ₃ CH ₃ | Ethane | A3 | 1000 | 6400 | 0.54 |
| R-E170 | CH ₃ OCH ₃ | Dimethyl ether | A3 | 1000 ¹⁰ | — | 1.0 |
| R-218 | CF ₃ CF ₂ CF ₃ | Octafluoropropane | A1 | 1000 | — | 43 |
| R-227ea | CF ₃ CHFCF ₃ | 1, 1, 1, 2, 3, 3, 3- heptafluoropropane | A1 | 1000 | — | 36 |
| R-236fa | CF ₃ CH ₂ CF ₃ | 1, 1, 1, 3, 3, 3-hexafluoropropane | A1 | 1000 ¹³ | — | 21 |
| R-245fa | CHF ₂ CH ₂ CF ₃ | 1, 1, 1, 3, 3-pentafluoropropane | B1 | 300 ¹³ | — | 12 |
| R-290 | CH ₃ CH ₂ CH ₃ | Propane | A3 | 1000 | 2100 | 0.56 |
| R-C318 | -(CF ₂) ₄ - | Octafluorocyclobutane | A1 | 1000 ¹⁰ | — | 41 |
| R-400 | zeotrope | R-12/114 (50/50) | A1 | 1000 ¹⁰ | — | 10 |
| R-400 | zeotrope | R-12/114 (60/40) | A1 | 1000 | — | 11 |
| R-401A | zeotrope | R-22/152a/124 (53.0/13.0/34.0) | A1 | 1000 ¹⁰ | — | 6.6 |
| R-401B | zeotrope | R-22/152a/124 (61.0/11.0/28.0) | A1 | 1000 ¹⁰ | — | 7.2 |

TABLE 1102.2 (continued)
REFRIGERANT GROUPS, PROPERTIES, AND ALLOWABLE QUANTITIES^{1, 2, 3, 9}
[ASHRAE 34: TABLE 1, TABLE 2]

| REFRIGERANT | CHEMICAL FORMULA | CHEMICAL NAME ⁴ (COMPOSITION FOR BLENDS) | SAFETY GROUP ¹ | OEL ⁵ (ppm) | IDLH ⁶ (ppm) | POUNDS PER 1000 CUBIC FEET OF SPACE ⁷ |
|-------------|---|--|------------------------------|------------------------|-------------------------|--|
| R-600a | CH(CH ₃) ₂ CH ₃ | Isobutane (2-methyl propane) | A3 | 1000 | 3400 | 0.6 |
| R-601 | CH ₃ CH ₂ CH ₂ CH ₂ CH ₃ | Pentane | A3 | 600 | — | 0.2 |
| R-601a | (CH ₃) ₂ CHCH ₂ CH ₃ | 2-methylbutane (isopentane) | A3 | 600 | — | 0.2 |
| R-611 | HCOOCH ₃ | Methyl formate | B2 | 100 | — | — |
| R-702 | H ₂ | Hydrogen | A3 | — | — | — |
| R-704 | He | Helium | A1 | — | — | — |
| R-717 | NH ₃ | Ammonia | B2 | 50 ¹² | 300 | 0.014 |
| R-718 | H ₂ O | Water | A1 | — | — | See footnote 15 |
| R-720 | Ne | Neon | A1 | — | — | — |
| R-728 | N ₂ | Nitrogen | A1 | — | — | — |
| R-740 | Ar | Argon | A1 | — | — | — |
| R-744 | CO ₂ | Carbon dioxide | A1 | 5000 | 40 000 | 4.5 |
| R-764 | SO ₂ | Sulfur dioxide | B1 | 5 | 100 | — |
| R-1150 | CH ₂ =CH ₂ | Ethene (ethylene) | A3 | 200 | 5200 | 0.38 |
| R-1234yf | CF ₃ CF=CH ₂ | 2, 3, 3, 3-tetrafluoro-1-propene | A2 | 400 | — | 4.7 |
| R-1270 | CH ₃ CH=CH ₂ | Propene (propylene) | A3 | 500 | 3400 | 0.1 |